REMARKS

Claims 1-18 remain in this application. Applicant respectfully request re-examination.

Claims 1-3, 5-7, and 9-10 were rejected under 35 USC §103 as unpatentable over *Raguin* (U.S. Patent Appl. No. 2002/0182547) in view of *Kitano et al.* (U.S. Patent Appl. No. 2002/0088393). Applicant respectfully traverses.

A highly relevant inquiry in making an evaluation under 35 U.S.C. §103 is "[t]he relationship between the problem which the inventor. . . was attempting to solve and the problem to which any prior art reference is directed." *Stanley Works v. McKinney Mfg. Co.*, 216 USPQ, 298, 304 (Del. D.C. 1981). Thus, in analyzing the prior art under Section 103 of the Act, we must clearly comprehend the problem addressed by the present inventors and that problem must be compared or contrasted, as the case may be, with the problems addressed by the prior art.

Raguin is primarily concerned with fabricating a structure on a substrate with a low contrast photoresist having a height greater than or equal to 15 microns. *Raguin* identifies different methods for applying the photoresist material on the substrate. FIG. 4 shows the photoresist material spin-coated on the substrate (para. 0035). "In the dispense stage, photoresist 44 is applied using a spray, a pipette 45, or any other means of placing a puddle of the photosensitive material onto the substrate surface" (para. 0035).

Kitano et al. is primarily concerned with dividing a coating area of the substrate and discharging resist liquid 60 to coat each area separately (abstract). *Kitano et al.* describes a supply nozzle 6 with a resist liquid nozzle 61 and solvent nozzle 62 dispensing resist liquid 60 and solvent 64, respectively (para. 0083). To keep viscosity

constant for the resist liquid 60, supply nozzle 6 discharges solvent 64 in mist-like form to surround the liquid flow of the resist liquid 60.

Claim 1 recites "spray coating the first surface of the substrate with a negative-tone photoresist-solvent solution at an angle to the first surface to obtain coverage of deep etched features, the solvent having a higher volatility rate than the negative-tone photoresist, the negative-tone photoresist to solvent ratio being in the range of one to three and one to five and a half and having a viscosity of between one and three centipoises."

"Most commercially available photoresist is diluted to less than twenty (20) centipoise to be dispensed through the spray nozzle. By adding a faster drying solvent, i.e. more volatile, into the photoresist solution, the drying rate of the photoresist is effectively changed" (specification, para. 26). "This feature is especially important when coating deep trenches, since the cohesion of wet resist tends to pull photoresist away from edges and corners" (specification, para. 26). "However, excessively dry resist droplets tend to cause roughness and pores in the resist layer, which will result in significant amount of undercutting and defects in the subsequent etch processes. Therefore, a well-balanced solution is desirable to ensure the success of subsequent etching processes" (specification, para. 26).

The present invention addresses undercutting and defects problems by determining specific parameters that provide optimum results. Specifically, the negative-tone photoresist to solvent ratio being in the range of one to three and one to five and a half and having a viscosity of between one and three centipoises.

Although *Raguin* discusses a photosensitive material in solution, it does not disclose, teach or suggest that a solvent with a higher volatility rate than the negative-tone photoresist is mixed with the negative-tone photoresist to form a solution that is then sprayed on the surface of the substrate. Furthermore, *Raguin* fails to disclose, teach or suggest that the negative-tone photoresist to solvent ratio should be in the range of one to three and one to five and a half and have a viscosity of between one and three centipoises.

Kitano et al. does not remedy the deficiencies of *Raguin*. *Kitano et al.* teaches that the resist liquid 60 is applied through a separate nozzle from the solvent 64. The resist liquid 60 is not mixed in solution with the solvent 64. *Kitano et al.* fails to disclose, teach or suggest that the solvent has a higher volatility rate than the resist liquid 60. Furthermore, *Kitano et al.* fails to disclose, teach or suggest that the negative-tone photoresist to solvent ratio should be in the range of one to three and one to five and a half and have a viscosity of between one and three centipoises.

The Office Action contends that it "would have been obvious to a skilled artisan to modify *Raguin* by employing the method of adjusting the ratio of the resist content (solid) to the thinner (solvent) ratio, and the resultant viscosity as suggest by *Kitano*" (Office Action, pg. 3).

> A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.).

MPEP §2144.05 (II)(B) (underline added)

Neither *Raguin* nor *Kitano et al.* recognize the advantages and consequences of mixing a more volatile solvent with a photoresist solution. They fail to recognize that having a negative-tone photoresist to solvent ratio being in the range of one to three and one to five and a half and having a viscosity of between one and three centipoises will address undercutting and defects problems in subsequent etching processes. Therefore, the determination of the claimed ranges cannot be characterized as routine experimentation.

Applicants respectfully request that the rejection be withdrawn.

Claims 2-4 depend from claim 1. Thus, these claims are patentably distinct from the prior art references for the same reasons advanced above with respect to claim 1. Moreover, independent claim 5, and its dependent claims 6-10, are also patentably distinct from the prior art references for the same reasons advanced above with respect to claim 1.

Claims 11, 13-18 were rejected under 35 USC §103 as obvious in light of *Raguin* in view of *Research Disclosure* (Kenneth Mason Publications, vol. 324, April 1991) (referred to herein as "*RD91*"). Applicant respectfully traverses.

Claim 11 recites a method for coating photoresist on a substrate having deep features. The substrate is primed "by immersing it into a priming solution, the priming solution having a water contact angle of between forty and fifty degrees."

The Office Action contends that paragraph 33 of *Raguin* teaches acid solutions with contact angles less than 90° (Office Action, pg. 5). The Office Action contends that *Raguin* teaches "cleaning substrates using organic solvents or acids, which in turn will

cause the substrates to have contact angles greater than 40 degrees" (Office Action, pg. 8). Paragraph 33 of *Raguin* does not disclose, teach or suggest that the water contact angle is less than 90°, nor does it specifically identify any range for a water contact angle. The Office Action does not cite to any reference that suggests that organic solvents or acids cause the substrates to have contact angles greater than 40 degrees.

It appears that the Office Action is taking judicial notice to extend the teaching of *Raguin*. This is a reversible error. See ex parte *Nouel*, 158 U.S.P.Q. 237 (P.O. Board of Appeals, July 1968).

The *RD91* reference does not remedy the deficiencies of *Raguin*. It is presumed that the *RD91* reference is cited simply for the teaching of immersion in a fluid followed by thorough rinsing and drying. The *RD91* reference teaches the cleaning of a stainless steel and copper laminate surface prior to the application of a dry film photoresist. The *RD91* reference does not provide any suggestion or motivation that the preparation of a stainless steel surface is the same as or similar to the preparation of a substrate wafer.

A person skilled in the art would not employ the preparation techniques of a stainless steel metal for a substrate wafer. The substrate wafer has different structural and chemical characteristics from stainless steel. The Office Action does not provide any reference that suggests that the preparation techniques for stainless steel metal are equally applicable to substrate wafers.

Applicants respectfully request that the rejection be withdrawn.

Claims 12-18 depend from Claim 11. Thus, these claims are also patentably distinct for the same reasons advanced above with respect to Claim 11.

Claims 12-18 depend from Claim 11. Thus, these claims are also patentably distinct for the same reasons advanced above with respect to Claim 11.

In light of the above amendment and remarks, applicant respectfully submits that all the claims are now in condition for allowance and respectfully requests that this application be passed to issue.

I hereby certify that this correspondence is being deposited with the United States Postal Service as "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on March 9, 2007.

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Very truly yours,

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